

REMARKS

The present invention is a transmitting and receiving switching circuit of a wireless communication system and a transmitting and receiving switching method of a wireless communication system. A transmitting and receiving switching circuit of a wireless communication system in accordance with the invention includes a controller 20, a selecting portion 10 which provides an input to the controller which determines a transmitting or receiving frequency according to operation of the selecting portion and a band selecting portion 30, connected to an output of the controller, which selects an input signal of an upper band or a lower band of a received signal which passes through an antenna and a duplexer 40 while generating a control signal for determining a transmitting frequency of the system. First and second switching portions 45 and 60 are connected at outputs thereof to first and second filter portions 50 and 65 including upper and lower bands which are switched in response to the control signal output by the band selecting portion and which select any one of the upper and lower bands corresponding to the received signal passing through the duplexer. The first filter portion 50 is connected at an output thereof to an amplifying portion 55 which amplifies a filter's signal output from the first filter portion and outputs an amplified filtered signal to the second filter portion 65 through the second switching portion. The second filter portion is connected between the amplifying portion and a mixer 75 which filters a received signal passing through the second filter portion and the mixer mixes a local oscillator frequency from local oscillator 70. An intermediate frequency filtering portion 77 filters an intermediate frequency from the mixer. A transmit mode determining

portion 90 is coupled to the band selecting portion 30, which transmits a transmit signal with a transmitting frequency determined by the control signal outputted by the band selecting portion.

Claims 1 and 2 stand rejected under 35 U.S.C. §103 as being unpatentable over United States Patent 6,115,592 (Ueda et al) and claim 2 stands rejected under 35 U.S.C. §102 as being anticipated by Ueda et al. These grounds of rejection are traversed with respect to newly submitted claims 3 and 4. Newly submitted claims 3 and 4 recite:

A transmitting and receiving switching circuit of a wireless communication system comprising:

- a controller, a selecting portion, connected to an input of the controller, which determines a transmitting or receiving frequency according to operation of the selecting portion and a band selecting portion, connected to an output of the controller which outputs a control signal which selects an input signal of an upper band or a lower band of a received signal which passes through an antenna and a duplexer while generating the control signal for determining a transmitting frequency of the system;

- first and second switching portions connected at outputs thereof to first and second filter portions including upper and lower bands, which are switched in response to the control signal output by the band selecting portion and which selects any one of the upper and lower bands corresponding to the received signal passing through the duplexer;

- the first filter portion being connected at an output thereof to an amplifying portion which amplifies a filtered signal output from the first filter portion and outputs an amplified filtered signal to the second filter portion through the second switching portion,

- the second filter portion being connected between the amplifying portion and a mixer and which filters a received signal passing through the second filter portion;

- the mixer mixing a filtered signal output from the second filter portion with a local oscillator frequency from a local oscillator;

- an intermediate frequency filtering portion which filters an intermediate frequency out from the mixer; and

- a transmit mode determining portion, coupled to the band selecting portion, which transmits a transmit signal with a transmit frequency determined by the control signal output from the band selecting portion.

A transmitting and receiving switching method of a wireless communication system comprising the steps of:

judging whether the communication system is in a transmitting mode or a receiving mode to determine a transmitting or receiving frequency;

automatically first switching a transmitting channel and a receiving channel, to place the transmitting channel on an upper band and the receiving channel on a lower band;

performing a transmitting or receiving operation in association with another communication system corresponding thereto after the first transmitting or receiving channel switching;

judging whether the transmitting or receiving operation is finished and when finished switching the transmitting or receiving mode into a waiting mode;

judging whether the communication system is in another mode of the transmitting mode and receiving mode to determine another transmitting or receiving mode; and

automatically second switching the transmitting channel, and the receiving channel to place the transmitting channel on the upper band and the receiving channel on the lower band.

Ueda et al disclose a dual band radio transceiver system which operates in two respective bands which are either 800 MHz or 1.5 GHz. As illustrated in Fig. 2, a radio transmitter unit 13 includes dual band filtering devices 15 and 17 and a radio receiver 14 includes dual band filtering devices 18 and 20. The above-mentioned filter devices are dual band devices with the Examiner relying upon Fig. 23 as being exemplary. While Ueda et al do disclose a dual band radio transmitting and receiving system, the operation of the transmitter and receiver are independent of each other.

As a result of the independence of the operation of Ueda et al's transmitter and receiver, claim 3 is neither anticipated nor rendered obvious by Ueda et al.

*There is no disclosure of the claimed first and second switching portions connected at outputs thereof to first and second filter portions including upper and lower bands

which are switched in response to the control signal output by the band selecting portion and which selects any one of the upper and lower bands corresponding to the received signal passing through the duplexer and further, the first filter portion being connected at an output thereof to an amplifying portion which amplifies a filtered signal output from the first filter portion and outputs an amplified filtered signal to the second filter portion through the second switching portion and the second filter portion being connected between the amplifying portion and the mixer and which filters a received signal passing through the second filter portion and a transmit mode determining portion, coupled to the band selecting portion, which transmits a transmit signal with a transmit frequency determined by the control signal output from the band selecting portion. None of this subject matter is present in Ueda et al for the reason that the transmitting and receiving sections operate independently thereof without any of the controlled functions as recited in claim 3. Moreover, there is no basis why a person of ordinary skill in the art would be led to modify the teachings of Ueda et al to arrive at this subject matter given the independent operation of the transmitting and receiving portions of Ueda et al.

Claim 4 is also neither anticipated nor rendered obvious by Ueda et al in view of then independent operation of the transmitter and receiver sections. Ueda et al do not disclose switching a transmitting channel, automatically, to place the transmit channel on another band and the receiving channel on a lower band, performing a transmitting or receiving operation to be associated with another communication system corresponding thereto after a first transmitting or receiving channel switching. In this regard, it is noted that Ueda et al merely refers to the dual band radio transmitting and receiving unit without operation dependent or associated with

another communication system. Claim 4 further recites judging whether the transmitting or receiving operation is finished and when finished, switching the transmitting or receiving mode into a waiting mode. In this regard, the Examiner suggests that such operation is inherent. However, inherency requires the Examiner to demonstrate that that which is inherent is necessarily present. There is no basis to conclude that after the transmitting and receiving operation is finished in Ueda et al, that their the device does maintain its status in what was the last mode of either a transmitting mode or a receiving mode. Finally, claim 4 recites twice automatically switching the transmitting or receiving channel to place the transmit channel on the upper band and the received channel on the lower band. This mode of operation of first and second automatic switching of the transmitting channel and the receiving channel to place the transmit channel on the upper band and the receiving channel is not disclosed by Ueda et al. Moreover, there is no basis why a person of ordinary skill in the art would be led to modify the teachings of Ueda et al to arrive at this subject matter given the independent operation of the transmitting and receiving portions of Ueda et al.

In view of the foregoing amendments and remarks, it is submitted that claims 3 and 4 are in condition for allowance. Accordingly, early allowance thereof is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with the

filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (1081.39543X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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Attachments

DES:dlh

1081.39543X00OP00104USLEES(1)SUBSTITUTE SPECIFICATION

Title of the Invention

Transmit-Receive Switching Circuit and Method
of Wireless Communication System

Background of the Invention

Field of the Invention

[0001] The invention ~~is related~~ relates to providing a wireless communication system, and particularly, to providing a transmit-receive switching circuit and method for alternatively switching a transmit-receive frequency into a corresponding transmit-receive channel, ~~alternatively~~.

[0002] In other words, the transmit-receive switching operation is performed so that as a master transmits a frequency from ~~its~~ an upper channel thereof for the communication, a slave receives the frequency into ~~its~~ an upper channel thereof and transmits another frequency from ~~its~~ a lower channel thereof, while the master receives from ~~its~~ a lower channel thereof, in which the transmit-receive frequencies are switched into different channels which do not ~~to~~ intervene each other.

[0003] Herein, it is noted that the wireless communication system generally means "Mobile Radio Equipment" divided into ~~the~~ a master and ~~the~~ a slave.

Description of the Prior Art

[0004] In general, ~~the~~ a wireless communication system uses FRS of ~~the~~ a mobile radio communication, for which a communication frequency is first set between a master and a slave, ~~the~~ The master transmits ~~a~~ a predetermined information to the slave, ~~the~~ The slave switches ~~the~~ from receive mode into the transmit mode in order to transmit information in response to the information from the master and the master switches ~~the~~ from transmit mode into the receive mode so as to receive information in response to the information from the slave.

[0005] If ~~the~~ simultaneously ~~simultaneous~~ communication occurs between the master and the slave, the master is always set to place a transmit channel ~~on~~ in an upper band and a receive channel ~~on~~ in a lower band, while the slave is adjusted to place a transmit channel ~~on~~ in a lower band and a receive channel ~~on~~ in an upper band. The communication system uses a half-duplex communication method with the same frequency, because the transmit-receive frequency band is fixed.

[0006] The communication method and system has problems in that it is inconvenient for users to switch a system into a predetermined mode upon every transmit-receive operating for the communication and to use the fixed transmit-receive frequency for a full-duplex communication between the master and the slave.

[0007] Accordingly, in order to resolve the problems and disadvantages described above, ~~an object of the invention is to~~ provides a transmit-receive

switching circuit and method of a wireless communication system for alternatively switching a transmit-receive frequency into a corresponding transmit-receive channel, ~~alternatively~~.

[0008] The other object of the invention is to provide a transmit-receive switching circuit and method of a wireless communication system for preventing the intervention at a frequency channel between a master and a slave to enable the simultaneous communication.

SUMMARY OF THE INVENTION

[0009] ~~In order to accomplish the objects of the invention above function,~~ a transmit-receive switching circuit of a wireless communication system in accordance with the invention comprises a selecting portion for switching the communication system in a waiting mode into a master; a controller for determining a transmit-receive frequency according to the operating of the selecting portion and generating a control signal; a band selecting portion for selecting an inputting signal of an upper band or a lower band of a receiving signal passed through an antenna and a duplex according to the control signal of the controller; a first switching portion for selecting an upper band pass filter and a lower band pass filter that are operated by the band selecting portion; an amplifying portion for amplifying a receive signal passing through the switching portion; a second switching portion for switching the receive signal amplified at the amplifying portion according to the operating signal of the band selecting portion and determining to be supplied to an upper band filter or a lower band pass filter of a second filtering portion; a mixer for mixing the receive signal

passing through the second filter with a local oscillating frequency from a local oscillator; a filtering portion for filtering an intermediate frequency from the mixed frequency; and a transmit mode determining portion for determining/transmitting a transmit frequency according to a signal outputted from the band selecting portion.

[0010] A transmit-receive switching method comprises steps of setting a receiving channel at an upper channel and a transmit channel at a lower channel upon the operating of a communication system and switching the communication system into a waiting mode; judging whether the communication system is a master to try the communication; switching the transmit-receive channel, automatically, to place the transmit channel on the upper band and the receive channel on the lower band, firstly, if it is determined as the master; performing the transmit-receive operating at a state determined by the first transmit-receive channel switching step; judging whether the transmit-receive operating is finished and switching the transmit-receive mode into the waiting mode if finished; judging whether the communication system is a slave, if the communication system is not the master at the master-judging step; and switching the transmit-receive channel, automatically, to place the transmit channel on the upper band and the receive channel on the lower band, secondly, if it is determined as the slave.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention now will be described in detail with reference to the accompanying drawings, in which:

[0012] Fig. 1 is a view illustrating a transmit-receive switching circuit of a wireless communication system according to the invention; and,

[0013] Fig. 2 is a flow chart illustrating the operating of a transmit-receive switching circuit of a wireless communication system according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Referring to Fig. 1, a controller 20 is connected to a selecting portion 10 to determine a transmit-receive frequency according to the selection of the selecting portion 10, which converts a communication system ~~to be waited for the communication in a waiting mode~~ into a master; and outputs a control signal. A band-selecting portion 30 outputs an operating signal for selecting ~~the~~ an upper channel and ~~the~~ a lower channel according to the control signal from the controller 20.

[0015] A first switching portion 45 includes ~~an antilegan analog~~ switch that is switched according to the operating signal from the band selecting portion 30 and for determining whether a receive signal passing through an antenna and a duplex portion is supplied to an upper band pass filter or a lower band pass filter of a first filtering portion 50. A second switching portion 60 is switched according to the operating signal of the band-selecting portion 30 to supply a signal filtered by the first filtering portion 50 and then amplified by an amplifying portion 55 and applied to an upper filter or a lower filter of a second filtering portion 65. Herein, if the master is operated to transmit using the lower band and receive using the upper band, only the upper filters of the first and second

filtering portions 50 and 65 are operated to permit a predetermined frequency, for example a frequency of 449.1375MHz to be passed there through, while the lower filters becomes ~~the non-operating inactive~~ and doesn't permit the predetermined frequency of for example 449.1375MHz to be not be passed there through. ~~On the contrary,~~ If the slave is operated to transmit a predetermined frequency using lower bands and to receive a predetermined frequency using upper bands, in which the transmitting frequency is for example 424.1375MHz and the ~~receive-receiving~~ frequency is 424.1375MHz. That is, the transmitting frequency is not allowed to pass through first and second filtering portions 50 and 65, and only the ~~receive-receiving~~ frequency is passed through the first and second filtering portion.

[0016] A mixer 75 mixes ~~a the~~ received signal from the second filtering portion 65 with a local ~~oscillating-oscillator~~ frequency from a local oscillator 70. An intermediate frequency filtering portion 77 filters an intermediate frequency signal from the mixed frequency ~~mixed~~. A demodulating portion 80 demodulates ~~a signal from the second filtering portion 65 and a signal from the~~ intermediate frequency from the mixer 75 and outputs a demodulated signal ~~demodulated thereby~~. A transmit mode determining portion 90 determines a transmit frequency according to the signal from the band selecting portion 30 and enables the transmit frequency to be amplified passing through a transmit output amplifying portion 95 and then passed through the duplex portion 40 and the antenna in order, thereby transmitting a predetermined frequency to another communication system.

[0017] The operation of the transmit-receive switching circuit as described above now will be described in detail with reference to the flow chart of Fig. 2.

[0018] ~~As Since~~ a wireless communication system provided with the ~~trans-receive-transmitting-receiving~~ switching circuit according to the invention is operated with a power source being applied thereto, ~~it-the system~~ is switched into a waiting mode as step S1. Step S1 ~~goes-proceeds~~ to step S2 ~~that-at~~ which the controller 20 ~~is-judges~~ whether the selecting portion 10 is ~~operated~~ operating or not. In other words, assuming that the communication system is a master, the controller 20 forces the transmit mode determining portion 90 to determine a transmitting frequency ~~of-such as~~ 449.1375MHz and supply ~~it-the~~ transmitting frequency through the transmit output amplifying portion 95 to the antenna, while ~~it-outputs-outputting~~ a control signal to the band selecting portion 30 to convert a receiving signal into a frequency ~~of-such as~~ 449.1375MHz, in which the band selecting portion 30 applies a control signal to the control terminals of the first and second switching portion 45 and 60, so that their ~~moving-input~~ terminals are connected to ~~the-normal-selected~~ output terminals. Therefore, a transmitting channel is placed on the upper channel of the filtering portion 50 and a ~~receive-receiving~~ channel is ~~set-at-placed~~ on the lower channel of the filtering portion 50, ~~that-and~~ a receive signal passes through the antenna and the duplex portion 40 and then is filtered at the lower channel, and vice versa.

[0019] After the switching of the transmit-receive channel, step S2 goes to step S3 ~~that-it-is-judged-at~~ which judgment occurs whether the communication system is a master. If so, step S3 proceeds to step S4 ~~that-at~~ which the

~~transmit-receive-transmitting-receiving~~ channels are respectively fixed on the upper channel and the lower channel. At step S5, the communication system becomes the master to perform the ~~transmit-receive-transmitting-receiving~~ operation with the slave. Step S5 goes to step S6 that it is judged at which judgment occurs whether the ~~transmit-receive-operating-transmitting-receiving operation~~ is finished. If the controller 20 identifies the operating of the selecting portion 10, for example the selecting portion 10 returns to the original position or receives an inputting signal such as ~~the~~ a communication suspension from an outside, step S6 proceeds to step S7 ~~that at which~~ the communication system is set ~~at the~~ in a waiting mode ~~of for the transmit-receive-transmitting-receiving operation~~.

[0020] On the other hand, if it is judged that the communication system is not the master at step S2, step S2 goes to step S8 ~~that it is judged at which judgment occurs~~ whether the communication system is in ~~a receive mode~~ receiving mode. If the communication system is being switched into the receive mode, step S8 goes to step S9 ~~that the transmit at which the transmitting channel is switched into the upper channel of the first filtering portion 50 and the receive-receiving channel is switched into the lower channel of the first filtering portion 50.~~

[0021] As described above, a master ~~to be transmitted which transmits~~ or a slave ~~to be received for which receives~~ the communications is automatically switched into their designated ~~transmit-receive-transmitting-receiving~~ channels to prevent the intervention of the ~~transmit-receive-transmitting-receiving~~ frequencies with each other at the frequency channel.

ABSTRACT OF THE DISCLOSURE

A ~~transmit-receive-transmitting-receiving~~ switching circuit of a wireless communication system comprises a selecting portion for switching the communication system in a waiting mode into a master; a controller for determining a ~~transmit-receive-transmitting-receiving~~ frequency according to the operating of the selecting portion and generating a control signal; a band selecting portion for selecting an inputting signal of an upper band or a lower band of a receiving signal passed through an antenna and a duplexer according to the control signal of the controller; a first switching portion for selecting an upper band pass filter and a lower band pass filter that are operated by the band selecting portion; an amplifying portion for amplifying a received signal passing through the switching portion; a second switching portion for switching the received signal amplified at the amplifying portion according to the operating signal of the band selecting portion and determining whether to be supplied to an upper band filter or a lower band pass filter of a second filtering portion; a mixer for mixing the received signal passing through the second filter with a local ~~oscillating~~-oscillator frequency from a local oscillator; a filtering portion for filtering an intermediate frequency from the mixed frequency; and a transmit mode determining portion for determining/~~transmitting~~ a transmitting frequency according to a signal outputted from the band selecting portion. Therefore, as ~~when~~ any one of the wireless mobile communication systems is determined as a master ~~to try the communication~~, the master switches the ~~transmit-receive-transmitting-receiving~~ frequency bands into those ~~contrary to~~ differing from the slave, thereby

preventing the intervention of the ~~transmit-receive~~ transmitting-receiving frequencies with the slave and enabling the communication between the master and the slave at the same time.